difference in the composition of the polyester (Ref 6). The absorption spectra of the compounds enumerated are listed in the preceding report (Ref 7). The changes in the properties of the irradiated foils were determined from the changes in molecular weights, mechanical properties, and spectral characteristics. It was found that the decomposition of polyethylene terephthalate on full ultraviolet irradiation by the above mentioned lamp occurs far more intensively than on irradiation at a wave length of 300-320 mμ. The addition of low-molecular organic compounds to the polyethylene terephthalate affects its decomposition process. The results obtained harmonize with those arrived at under identical conditions on the decomposition of polystyrene. There are 6 figures, 1 table, and 8 references, 2 of which are Soviet.

SUBMITTED: August 5, 1957

KORSHAK, V.V.; POLYAKOVA, A.M.; SAKHAROVA, A.A.; PETROV, A.D.; CHERNYSHEV, Ye.A.

Polymerization and copolymerization of unsaturated silicon organic compounds. Dokl. AN SSSR 119 no.2:282-284 Mr '58. (MIRA 11:5)

1. Institut elementoorganicheskikh soyedineniy AN SSSR i Institut korrespondenty AN SSSR (for Korshak, Petrov).
(Styrene) (Polymerization) (Silicon organic compounds)

SOV/20-121-2-29/53

AUTHORS: Korshak, V. V., Corresponding Member, Academy of Sciences, USSR, Sosin, S. L., Chistyakova, M. V.

TITLE: The Use of the Polyrecombination Reaction in the Production of Polymers (Primeneniye reaktsii polirekombinatsii dlya polucheniya polimerov)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 121, Nr 2, pp. 299 - 302 (USSR)

ABSTRACT: Many scientists have observed the effect of free radicals forming due to the decomposition of peroxides on the formation of compounds which are dimers of those radicals which are the residue of the solvent after the subtraction of a hydrogen atom (Ref 1). The authors could prove that the reaction may, on certain conditions, take such a course that it does no longer supply dimers of the solvent but only high-molecular compounds (Ref 2). This takes place because of a polyrecombination reaction. The present article describes new experimental results. The p-di-isopropyl benzene was the initial substance while various peroxides (mainly tertiary butyl peroxide) served as

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a source of the free radicals. The mentioned peroxide was added gradually to a layer of hydrocarbon at 170 - 200°. On this occasion a polymer formed which contains, according to the conditions of reaction, a smaller or larger amount of the insoluble three-dimensional part. The soluble part was extracted by benzene and was precipitated with methanol. The polymer is a white powder with a melting point of 210 - 230°. It was proved radiographically that the degree of crystallization of the soluble polymer does not exceed 10% and that for this reason it has to be regarded as practically amorphous. The insoluble polymer decomposes at about 300°; its degree of crystallization reaches 60%. Figure 1 shows that with the increasing amount of peroxide also the molecular weight of the polymer produced increases. At a molar ratio of peroxide and hydrocarbon = 1 the latter is practically converted completely into various reaction products. The amount of high molecular products reaches, however, 100% only at the mentioned ratio = 3. Thus the first mole of the peroxide reacts with the initial hydrocarbon. The 2nd and 3rd moles, however, react already with the products of conversion which represent a mixture of

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di- and trimers. The first stage is the decomposition of the peroxide with the formation of free radicals. They are tertiary butoxyl-as well as methyl radicals. They are at different ratios depending on the temperature and the properties of the solvent. About half of the peroxide decomposes under the formation of butoxy radicals. The higher the temperature the more marked becomes the decomposition under the formation of methyl radicals. The authors describe further conversions and characterize the reaction discussed as one related to the polycondensation. Table 1 shows the results obtained in using other initial products.
There are 2 figures, 1 table, and 5 references, 1 of which is Soviet.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elementoorganic Compounds, AS USSR)

SUBMITTED: March 28, 1958

SOV/20-121-3-18/47

AUTHORS: Korshak, V. V., Corresponding Member, Academy of Sciences, USSR; Frunze, T. M.

TITLE: Some Regularities of Melting Temperature Variations in Homological Series of Hetero Chain Polymers (O nekotorykh zakonomernostyakh izmeneniya temperatury plavleniya v gomologicheskikh ryadakh geterotsepnykh polimerov)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 121, Nr 3, pp.458-461 (USSR)

ABSTRACT: The very interesting problem of the relation between the structure of the polymers and their properties was frequently investigated. (Refs 1-3). Later on more detailed investigations showed that there is a linear dependence not only in the case of the straight polyamide series but also in other series of the compounds mentioned in the title. Therefore the authors investigated the homological series of polyureas, polyamides, polyurethanes, polyethers and polyanhydrides. It turned out that in all these series there is a certain dependence between the number of methylene groups in the member and the

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Some Regularities of Melting Temperature Variations in Homological Series of Hetero Chain Polymers

melting temperatures of the polymers (Ref 4, polyamides). The conformity of the mentioned polymer types proved to be so complete that in the case of a graphical representation of the dependence between the melting temperature and the characteristic features of hetero chains all lines on the diagram intersect the axis of ordinates in one point. The ratio between the number of hetero bindings in the member and the number of methylene groups in % forms the characteristic feature of hetero chains (Ref 5). According to figure 1a the line plotted through the experimentally obtained points is close to the straight line. Hence, in each polyamide series of the same structure a linear dependence of the mentioned properties exists. Thus, the angle of inclination of the lines concerned is changed according to the structure of the member. In the case of polyamides obtained from acids and diamines with an even number of methylene groups in the molecule this angle is largest. It makes a difference whether the odd number of those groups is in the diamine or in the dicarboxylic acid. The inclination of the angle depends on that. An equation was derived for each of the mentioned groups

Some Regularities of Melting Temperature Variations in Homological Series of Hetero Chain Polymers

of compounds (Table 1). According to figure 1a - v the line plotted through the experimentally obtained points is close enough to the straight line constructed according to equations. The angle of inclination of the straight line varies according to the structure of hetero compounds. It is largest in the case of polyureas followed by polyamides with an even number of methylene groups then with various combinations of odd members. They are followed by polyurethanes and finally by polyamides with sulfide sulfur and a mono ether binding in the macromolecular chain. There are 1 figure, 1 table, and 8 references, 4 of which are Soviet.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemento-Organic Compounds AS USSR)

SUBMITTED: April 14, 1958

AUTHORS: Korshak, V. V., Corresponding Member AS USSR, Mozgova, K. K., Shkolina, M. A. SOV/20-122-4-19/57

TITLE: On the Production of Grafted Copolymers of Polyamides With Vinyl Monomers (O poluchenii privitykh sopolimerov poliamidov s vinil'nymi monomerami)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 4, pp 609-611 (USSR)

ABSTRACT: As grafted copolymers open new synthetic possibilities, they have attracted lately to an ever greater extent the attention of the researchers (Refs 1, 2). In all hitherto known methods the formation of grafted copolymers is accompanied by that of block polymers in most cases. The authors tried to work out a production method which does not lead to the formation of block copolymers. For this purpose the initial polyamides were treated with ozone and only subsequently with vinyl monomers: styrene or methyl-methacrylate. Thus, a layer of the injected copolymer appeared on the surface of the polyamide. First the ozone influence on polyamides during different intervals was rechecked (2 minutes - 6 hours). The measurement results of the mentioned layer are shown in table 1. They show that the quality indices

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of the caprone film are not reduced, but are even increased by a short ozonization (10 - 20 minutes). Quality is reduced only in the case of an ozonization lasting 1 hour and more. Quality also decreases when the produced polymer layers are heated up to five hours. Further experiments with covers of polyamide anide G-669 (Ref 3) yielded the results compiled in table 2. They show the same picture as in the case of polycapralactame (Ref 3). Table 3 shows measuring results of the initial samples of the polyamides and the same samples after ozonization and polymerization. They show that the specific viscosity of the solution increases after ozonization. A still greater increase is observed after polymerization of an ozonized sample of the polyamide. Table 4 shows elementary analyses of several injected copolymers. From the results obtained the authors draw the conclusion that in consequence of the procedure used by them, a layer of polystyrene or polymethyl-methacrylate is formed which is apparently to be found on the surface of the polyamide film or of the polyamide fiber and is chemically connected with them. The vaccinated layer does not increase unlimitedly, it does not surpass 20 percentages by weight. Polyamide loses its

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solubility in alcohol in this connection as well as the solubility in cresol and formamide. A probable reaction scheme is given. Obviously peroxide compounds are produced first in the amide groups of the polyamide subsequently joined by molecules of the vinyl monomer. There are 3 tables and 3 references, 1 of which is Soviet.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elementary Organic Compounds of the Academy of Sciences, USSR)

SUBMITTED: June 19, 1958

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dvukhatomnymi fenolami)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 5 pp 849-852 (USSR)

ABSTRACT: The reaction of double decomposition, an example of which is the interaction of the acid chlorides mentioned in the title with diols, represents the hitherto least investigated instance of polyester formation (Refs 1-6). A previous paper (Ref 7) by the authors contained data on polyesters of aromatic dicarboxylic acids and of biatomic phenols. In the present paper, an investigation was to be made of the formation of this polyester by the following equation:
$HOArOH + ClOCArCOCl \longrightarrow HCl + \ldots - OArOOCArCO - \ldots$
The kinetics of the polycondensation was investigated in the interaction of the acid chlorides of isophthalic and terephthalic acids with p,p'-dioxyphenyl-propane between

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150 and 210°, of the acid chloride of terephthalic acid with o,o'-dioxy-diphenyl, resorcin and hydroquinone at 170°, and, finally, of the acid chloride of sebacic acid with p,p'-dioxy-diphenyl-propane at 150°. The reaction was carried out in a dinyl solution in a current of dry purified nitrogen. The reaction proceeded according to a bimolecular mechanism (according to van't Hoff (Vant-Goff) in Ref 8). Table 1 presents the velocity constants and the transformation of these reactions. The velocity constants of the reactions of p,p'-dioxy-diphenyl-propane with the acid chlorides of tere-and isophthalic acids were modified in accordance with the Arrhenius equation (Fig 1). From these equations, the energies of activation of the individual reactions, as well as the temperature coefficients of the reaction were calculated (Table). At 170°, the individual substances can be classified as follows with regard to the velocity of the reaction with the acid chloride of terephthalic acid: hydroquinone > resorcin > o,o'-dioxy-diphenyl> p,p'-dioxy-diphenyl-propane. The differences among the latter 3 substances are not high. From table 1 it can be seen that the transformation in the reaction increases with rising temperatures

(duration: 7 hours). However, the transformation in the reaction of p,p'-dioxy-diphenyl-propane with the acid chloride of isophthalic acid is only 0.72, even at 210°. At 220° and at a higher initial concentration, a transformation of 0.975 could be achieved after a reaction duration of 7 hours. From figure 2 it can be seen that the viscosity of the polyester, i. e. its molecular weight, increases continuously with a continued reaction duration. The development of the polymer chain takes place after 3-4 hours, due mainly to the interreaction of the polymeric molecules. There are 2 figures, 2 tables, and 8 references, 3 of which are Soviet.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental-Organic Compounds of the Academy of Sciences, USSR)

SUBMITTED: July 3, 1958

5(3) PHASE I BOOK EXPLOITATION SOV/2718

Akademiya nauk SSR. Institut nauchnoy informatsii

Khimiya i tekhnologiya sinteticheskikh vysokomolekulyarnykh soyedineniy; [Obzor literatury /za 1953-1956 gg./ po khimii i tekhnologii sinteticheskikh vysokomolekulyarnykh soyedineniy] vyp. 1 (Chemistry and Technology of Synthetic High Molecular Weight Compounds; Literature Review for the Years 1953-1956 on the Chemistry and Technology of Synthetic High Molecular Weight compounds, No. 1) Moscow, Izd-vo AN SSSR, 1959. 2 v. (1095 p.) (Series: Itogi nauki; khimicheskiye nauki, 3) Errata slips inserted. 4,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut elementoorganicheskikh soyedineniy.

Ed.: V.V. Korshak, Corresponding Member, USSR Academy of Sciences; Ed. of Publishing House: I.A. Gribova; Tech. Eds.: P.S. Kashina and N.D. Novichkova.

PURPOSE: This book is intended for chemists concerned with the chemistry and technology of synthetic high molecular weight compounds.

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compounds; copolymers [illegible]
Only limited production data were given to illustrate the dynamics and

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scope of the development of individual fields of polymer technology. The Introduction and Chapters 1, 2 and 3 were written by V.V. Korshak; Chapter 4 by Ya.S. Krongauz; Chapter 5 by S.V. Rogozhin; Chapter 6 by Ye.F. Rodionova; Chapter 7 by N.G. Matveyeva; Chapter 8 by M.V. Chistyakova; Chapter 9 by S.L. Sosna; Chapter 10 by S.V. Vinogradov; and Chapter 11 by T.M. Frunze. The sections of Chapter 11 on polyurethanes and polyaminotriazoles were written by G.N. Chelnokova. Chapter 12 was written by I.A. Gribova, Chapter 13 by A.A. [illegible], and Chapter 14 by K.K. Mosgova.

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[Bibliography, 59 entries]

Chemistry and Technology (Cont.) SOV/3712

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Chemistry and Technology (Cont.) SOV/2718

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KORSHAK, V.V. , red.; GRIBOVA, I.A. , red.izd-va; KASHINA, P.S., tekhn. red.; NOVICHKOVA, N.D., tekhn.red.

[Chemistry and technology of synthetic macromolecular compounds, no.1] Khimiia i tekhnologiia sinteticheskikh vysokomolekuliarnykh soedinenii, no.1. Moskva, Izd-vo Akad. nauk SSSR, 1959. 593 p. (Itogi nauki: Khimicheskie nauki, no.3) (MIRA 12:9)

1. Chlen-korrespondent AN SSSR (for Korshak).
(Macromolecular compounds)

5(3) SOV/62-59-1-25/38

AUTHORS: Korshak, V. V., Vinogradova, S. V.

TITLE: On Polyesters With Heterogeneous Chains (O geterotsepnykh poliefirakh)Communication XII. Polyesters of the Azobenzene-3,3'- and Azobenzene-4,4'-Dicarboxylic Acid (Soobshcheniye 12. Poliefiry azobenzol-3,3'- i azobenzol-4,4'-dikarbonovoy kisloty)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 1, pp 148 - 153 (USSR)

ABSTRACT: In the present paper the authors synthesized polyesters of the azobenzene-3,3'- and azobenzene-4,4'-dicarboxylic acid. They investigated the influence exercised by the aromatic nucleus and the azo group, which are simultaneously contained in the molecule of the initial acid, on the properties of the polyesters. The properties of the polyesters obtained and aliphatic glycols are given in the table. A comparison between the polyesters shows that they differ considerably. A modification of the mutual distribution of carboxyl groups in the initial azo acid varies the properties of the polyesters obtained from them. Polyesters of the azobenzene-4,4'-dicarboxylic acid possess a higher degree of crystalli-

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On Polyesters With Heterogeneous Chains. Communication XII. SOV/62-59-1-25/38
Polyesters of the Azobenzene-3,3'- and Azobenzene-4,4'-Dicarboxylic Acid

nity. Their temperature of softening is much higher than that of corresponding polyesters of the azobenzene-3,3'-dicarboxylic acid; they are less soluble. The disturbance of the symmetry of the molecule in the initial dicarboxylic acid caused by the modification of the mutual distribution of carboxyl groups leads to a disturbance of the arrangement of chains in the first members of the polyesters of the homologous series of glycols and to the destruction of crystallinity. In order to explain the influence exerted by the azo groups contained in the aromatic dicarboxylic acid it is useful to compare corresponding polyesters of the diphenyl-dicarboxylic acid with those of the azobenzene dicarboxylic acid. A comparison between the properties of polyesters of the azobenzene dicarboxylic acids with those of corresponding polyesters of the diphenyl-ethane and diphenyl-ethylene dicarboxylic acid would also be most informative. These comparisons could not be made completely since there were only data available on the polyester of the p,p'-diphenyl-ethane dicarboxylic acid. It was found that the temperatures of softening of polyesters of the azo-

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benzene-4,4'-dicarboxylic acids and glycols with short chains show greater differences, which disappear, however, in glycols with long chains. It is apparently due to the fact that on the prolongation of the aliphatic chain the influence of the azo group decreases. Beginning with a certain number of methylene groups in the initial glycol the influence of the azo group stops existing and the influence of the glycol becomes decisive. Unlike polyesters of the azobenzene-4,4'-dicarboxylic acids polyesters of the azobenzene-3,3'-dicarboxylic acids almost do not differ in their temperatures of softening. Presumably in this case the properties of polyesters are mainly influenced by the asymmetric distribution of the carboxyl groups in the initial acid which destroy the close packing of the polymer chain. The authors thank Yu. T. Struchkov and A. I. Yefimova for the radiographic analysis of polyesters which was performed at the Laboratory for X-Ray Structure Analysis (Head A. I. Kitaygorodskiy). There are 1 table and 6 references, 3 of which are Soviet.

On Polyesters With Heterogeneous Chains. Communication XII. SOV/62-59-1-25/38
Polyesters of the Azobenzene-3,3'- and Azobenzene-4,4'-Dicarboxylic Acid

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental-Organic Compounds of the Academy of Sciences, USSR)

SUBMITTED: April 26, 1957

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SOV/62-59-1-26/38

5(3)
AUTHORS: Korshak, V. V., Vinogradova, S. V.

TITLE: On Polyesters With Heterogeneous Chains (O geterotsepnykh poliefirakh)Communication XIII. Polyesters of p-Xylylene Glycol (Soobshcheniye 13. Poliefiry p-ksililenglikolya)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 1, pp 154 - 161 (USSR)

ABSTRACT: In the present paper the authors synthesized polyesters of the p-xylylene glycol with dicarboxylic acids of the aliphatic and aromatic series and investigated the influence of the aromatic nucleus contained in the glycol molecule on the properties of polyesters. Table 1 presents data on polyesters of the p-xylylene glycol and dicarboxylic acids. All polyesters, except the polyester of malonic acid, are colorless or cream-colored solid substances. The polyester attains the highest melting temperature with oxalic acid.In the series of polyesters of the p-xylylene glycol and aliphatic dicarboxylic acids - beginning with oxalic acid up to sebacic acid - a similar regularity is observed, as in the case of polyesters of the polymethylene glycols with even-

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numbered members on modifying the temperatures of softening. Since there were only small samples available of several substances it was not possible to plot all thermomechanical curves by means of the consistometer. It may be stated, however, according to the data obtained that the temperature change during the transition to the viscousliquid phase which is due to the number of carbon atoms contained in the dicarboxylic acid molecule, shows the same character as the change of their melting temperatures. In order to explain the influence exercised by the aromatic nucleus contained in the polymer chain in glycol residues upon the properties of polyesters it would be useful to compare polyesters of the p-xylylene glycol with the corresponding polyesters of the glycol of the aromatic series - the hexamethylene glycol (Table 2). Table 3 gives data on polyesters of the p-xylylene glycol with aromatic and hydroaromatic dicarboxylic acids. It is a typical feature of polyesters of the p-xylylene glycol with different aromatic acids that all acids with a symmetric structure (with carboxyl groups in the para-

On Polyesters With Hetergeneous Chains.Communication XIII.SOV/62-59-1-26/38
Polyesters of p-Xylylene Glycol

position) yield opaque polymers. In the case of less symmetric initial dicarboxylic acids polymers are obtained the crystallizability of which has disappeared or is complicated. When substituting a hydroaromatic system (hexahydroterephthalic acid) for the methylene groups in adipic acid transparent polymers are obtained the softening temperature of which depends on whether the initial acid is a cis- or trans-isomer. The trans-acid with a more symmetric structure yields polyesters with higher temperature of softening than the less symmetric cis-acid. The authors thank the coworkers of the Laboratory for X-Ray Structure Analysis (Head A. I. Kitaygorodskiy), Yu. T. Struchkov and A. I. Yefimova for the radiographic analysis of polymers, S. L. Sosin for the supply of dimethyl esters of the 2,5-dimethyl terephthalic, p,p'-diphenyl-ethane dicarboxylic and 3,4-diphenyl dicarboxylic acid as well as Ye. S. Krongauz for the hexadecane dicarboxylic acid. There are 3 tables and 6 references, 4 of which are Soviet.

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Inst Elemento Organic Compds. AS USSR

5(3) SOV/62-59-1-36/38

AUTHORS: Korshak, V. V., Polyakova, A. M., Mironov, V. F., Petrov, A. D.

TITLE: Polymerization of Vinyl and Allyl Derivatives of Elements of the IVth Group (Polimerizatsiya vinil- i allilproizvodnykh elementov IV gruppy)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 1, pp 178 - 180 (USSR)

ABSTRACT: In the present communication the authors compared the reactivity of unsaturated compounds of elements of the IVth group in ion reactions and radical polymerization. It was found that the reactivity of these compounds increases in ion reactions in the order C < Si < Ge < Sn. The inclination of the same compounds to radical polymerization increases in the inverse order of Sn < Ge < C < Si(Diagram). Among the structurally similar elements of the IVth group investigated alkenyl silanes incline most readily to polymerization. Thus, no deactivating effect is exercised by the silicon atom in polymerization unlike in contrast to carbon atoms in structurally similar olefins. Although tri-

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alkyl-allylstannanes do not polymerize themselves, they are capable of forming polymers with methyl methacrylate (Table 2). Furthermore, copolymerization products of trimethyl-allyl-germanium were obtained with styrene. There are 1 figure, 2 tables, and 7 references, 6 of which are Soviet.

ASSOCIATION: Institut elemento-organicheskikh soyedineniy (Institute of Elemental Organic Compounds)Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute of Organic Chemistry imeni N. D. Zelinskiy of the Academy of Sciences, USSR)

SUBMITTED: June 25, 1958

SOV/62-59-2-25/40

5(3)

AUTHORS: Korshak, V. V., Vinogradova, S. V.

TITLE: On Heterogenous Chain Polyesters (O geterotsepnykh poliefirakh). Communication 14. Polyesters of m-Xylylene Glycol (Soobshcheniye 14. Poliefiry m-ksililenglikolya)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye khimicheskikh nauk, 1959, Nr 2, pp 338-343 (USSR)

ABSTRACT: In the present paper polyesters of m-xylylene glycol were synthesized and investigated. In table 1 the data on polyesters of m-xylylene glycol with fatty dicarboxylic acids of different structure are given. It may be seen from it that the number of methylene groups contained in the polymethylene dicarboxylic acid influences the properties of polyesters of the m-xylylene glycol. Polyesters of m-xylylene glycol which were synthesized from dicarboxylic acids with an odd number of chain links are viscous liquids the softening temperature of which decreases with increasing methylene groups in the initial acid. Polyesters of dicarboxylic acids with an even number of carbon atoms in the molecule are opaque, solid compounds the softening temperatures of which also decrease with increasing methylene

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On Heterogenous Chain Polyesters. Communication 14. Polyesters of m-Xylylene Glycol

groups. The substitution of a simple ether bond for a methylene group in the glutaric acid molecule increases the softening temperature of the polymer. A similar effect is exercised by the introduction of the sulfo group into the chain of the polymethylene dicarboxylic acid. A comparison of the polyesters of m-xylylene glycol with fatty dicarboxylic acids to the corresponding polyesters of pentamethylene glycol (Ref 5) shows that the substitution of an aromatic nucleus for 3 methylene groups in the pentamethylene glycol molecule does not always involve an increase of the softening temperature. The introduction of the aromatic nucleus into the chain of an aliphatic glycol increases the rigidity of the polymer chain. By the use of aromatic dicarboxylic acids polyesters of m-xylylene glycol are formed which considerably differ from the polyesters of fatty dicarboxylic acids. The mutual distribution of carboxyl groups in the aromatic dicarboxylic acid exerts an effect on the temperatures of transition into the viscous-liquid state of the polyesters obtained (Table 2). A comparison of polyesters of m-xylylene glycol with aromatic dicarboxylic acids to the correspond-

On Heterogenous Chain Polyesters. Communication 14. Polyesters of m-Xylylene Glycol

ing polyesters of p-xylylene glycol shows that the change in the distribution of methylol groups in xylylene glycol alters the properties of the polyesters obtained. Polyesters of the less symmetrical m-xylylene glycol have lower softening temperatures than the corresponding polyesters of p-xylylene glycol. The comparison of polyesters of the isophthalic, m,m'-diphenyl dicarboxylic and diphenic acid to m-xylylene glycol and pentamethylene glycol (Refs 1,2) shows that the substitution of an aromatic nucleus for part of the methylene chain in pentamethylene glycol leads to softening and vitrification temparatures which are the higher the less symmetrical the dicarboxylic acid is. The comparison of the softening temperatures of several polyester pairs has shown that the substitution of a corresponding aromatic acid for the fatty dicarboxylic acid as well as the substitution of aromatic nuclei for part of the methylene groups in the polymethylene dicarboxylic acid and glycol mostly causes an increase of the softening temperature. Simultaneous substitution of aromatic nuclei for the methylene chain in acid and glycol involves in the case of polyesters of m-xylylene glycol

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not only an increase of the softening temperature of the polymers but also the destruction of their crystallizability or at least an inhibition of crystallization. There are 2 tables and 10 references, 7 of which are Soviet.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental-Organic Compounds of the Academy of Sciences, USSR)

SUBMITTED: April 26, 1957

5(3) SOV/62-59-3-23/37

AUTHORS: Frunze, T. M., Korshak, V. V., Kozlov, L. V.

TITLE: Investigations in the Field of the Polyamides With Heterogeneous Chains (Iz oblasti geterotseprykh poliamidov). Communication 9. Production of Polyamides and Polyamido Esters From Bis-Oxazolones (Soobshcheniye 9. Polucheniye poliamidov i poliamidoefirov iz bisoksazolonov)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 3, pp 535-539 (USSR)

ABSTRACT: In the present paper polyamides and polyamido esters were synthesized. Bis-oxazolones were used as initial products. In order to obtain these bis-oxazolones dicarboxylic acids such as the terephthalic and sebacic acid were used. These acids are transformed under the action of phosphorus pentachloride or thionyl chloride into the corresponding diacid chlorides. In the reaction of the latter with a solution of alkali or amino acid N-N'-acyl-bis-(α-amino acids)(Table 1) is formed. By heating these acids with acetic anhydride according to the method described in reference 1 bis-oxazolones were obtained (Table 1). Polyamides and polyamido esters formed due to

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the action of bis-oxazolones on diamines, amino alcohols or glycols in the solvent. Reaction temperature was not higher than 60°. The duration of reaction depends on the nature of the initial substances. Diamines react the most rapidly (5-14 hours), glycols and amino alcohols more slowly. E.g. the reaction of ethylene glycol or monoethanolamine takes up to 146 hours. Pyridine or chloroform were used as solvents. The polyamides obtained are solid, powdery, white substances. They are well soluble in cresol, insoluble in chloroform and benzene. The polyamido ester obtained from ethylene glycol which is well soluble in chloroform is an exception. The properties of the products obtained are given in table 2. The polyamides which were obtained from the reaction of bis-oxazolones with diamines and glycols and which have a regular structure have higher melting temperatures than the polyamides which were obtained by means of direct polycondensation and in which the residues of the initial products are irregularly distributed. In the case of a polymer with regular structure the substitution of octamethylene by the phenylene group leads to a greater

increase of the melting temperature than is the case with polymers with a macromolecule of irregular structure. The degree of crystallization was determined by Yu. S. Struchkov in the laboratoriya rentgenostrukturnogo analiza (Laboratory for X-Ray Structural Analysis). The thermomechanical curves were recorded by L. Z. Rogovina in the laboratoriya issledovaniya polimerov (Laboratory for the Investigation of Polymers). The authors express their thanks for the investigations carried out. There are 1 figure, 2 tables, and 3 references, 2 of which are Soviet.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental Organic Compounds of the Academy of Sciences, USSR)

SUBMITTED: June 13, 1957

5(3)

AUTHORS: Korshak, V. V., Golubev, V. V., Karpova, G. V., Dubova, T. A. SOV/62-59-3-24/37

TITLE: On Polyesters With Heterogeneous Chains (O geterotsepnykh poliefirakh). Communication 15. Mixed Polyesters of Tetramethylene Glycol and Two Dicarboxylic Acids (Soobshcheniye 15. Smeshannyye poliefiry tetrametilenglikolya i dvukh dikarbonovykh kislot)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 3, pp 540-545 (USSR)

ABSTRACT: In the present paper systems of mixed polyesters of tetramethylene glycol which contain the following dicarboxylic acids were investigated: terephthalic acid - succinic acid, terephthalic acid - glutaric acid, terephthalic acid - adipic acid, terephthalic acid - pimelic acid, terephthalic acid - suberic acid, terephthalic acid - azelaic acid, terephthalic acid - sebacic acid, sebacic acid - azelaic acid, sebacic acid - adipic acid, and azelaic acid - adipic acid. The ratio between the components was widely changed. The properties of the double, mixed polyesters investigated are given in tables 1-10. In the comparative tables the melting temperatures (filament formation) (Table 11) as well as the solubility (Table 12) of the mixed

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polyesters in benzene with heating, according to the composition and the ratio of the initial acids, are given. As may be seen from tables 1-10, the temperatures of filament formation as well as the solubilities of mixed polyesters of tetramethylene glycol change in a similar way as the polyesters of ethylene glycol (Ref 1). In this case there are also minima of the melting temperatures which coincide with the ratios 10/90, 20/80, or 30/70 mol% of terephthalic and aliphatic acid. The solubility of the polyesters of tetramethylene glycol is somewhat higher than that of the polyesters of ethylene glycol. Many of them are soluble in benzene. All corresponding polyesters of ethylene glycol are, however, insoluble. The melting temperatures of aromatic-aliphatic polyesters with 100 to 70 mol% of the terephthalic-acid content are higher than those of the corresponding polyesters of ethylene glycol. Polyesters of tetramethylene glycol containing 50 mol% and less of terephthalic acid melt at lower temperatures than corresponding polyesters of ethylene glycol. Polyesters of two aliphatic acids occupy a special place. In every ratio they form

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filaments at lower temperatures than aromatic - aliphatic polyesters and all of them are soluble in benzene. Numerous mixed polyesters of tetramethylene glycol form sufficiently solid foils and films which are capable of being stretched at low temperatures. There are 12 tables and 1 Soviet reference.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental Organic Compounds of the Academy of Sciences, USSR)

SUBMITTED: June 27, 1957

Card 3/3

KORSHAK, V.V.; SULTANOV, A.S.; ABDUVALIYEV, A.A.

Polymerization of furan and sylvan with the aid of ionic catalysts. Uzb.khim.zhur. no.4:39-47 '59. (MIRA 13:1)

1. Institut khimii polimerov AN UzSSR i Institut eksperimental'noy optiki i spektroskopii AN SSSR.
(Furan) (Catalysts) (Polymerization)

5(3)

AUTHORS: Korshak, V. V., Polyakova, A. M., Tambovtseva, Ye. S.

SOV/62-59-4-31/42

TITLE: Polymerisation of p-Triethyl-Stannyl-α-Methyl-Styrene (Polimerizatsiya p-trietilstannil-α-metilstirola)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 4, pp 742-744 (USSR)

ABSTRACT: This is a brief report on the investigation of the polymerization of p-triethyl stannyl-α-methyl styrene by radical mechanism under 6,000 atmospheres pressure. p-Triethyl stannyl-α-methyl styrene was synthesized according to the following scheme:

$$p\text{-}BrC_6COCH_3 \xrightarrow[(C_2H_5)_2O]{CH_3MgJ} p\text{-}BrC_6H_4C(CH_3)_2OH \xrightarrow[Al_2O_3,325^\circ]{-H_2O}$$

$$\longrightarrow p\text{-}BrC_6H_4C(CH_3)=CH_2 \xrightarrow[\text{tetrahydrofuran}]{Mg,(C_2H_5)_3SnCl} p\text{-}(C_2H_5)_3SnC_6H_4C(CH_3)=CH_2$$

The yield was ~50 %. Various initiators of the radical type were used in the investigation: azodinitrile of butyric acid (ADN), benzoyl peroxide, and tertiary butyl peroxide. The

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Polymerization of p-Triethyl-Stannyl-α-Methyl-Styrene SOV/62-59-4-31/42

results obtained are shown in the table. The best results were obtained when ADN was used. The thermodynamic curve (Fig) was determined for the samples obtained in the presence of this initiator. The curve of unsaturated methyl styrene obtained under similar conditions is shown in comparison. There are 1 figure, 1 table, and 7 references, 4 of which are Soviet.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental-organic Compounds of the Academy of Sciences, USSR)

SUBMITTED: August 4, 1958

Card 2/2

5(3)

AUTHORS: Korshak, V. V., Chelnokova, G. N., Shkolina, M. A. SOV/62-59-5-26/40

TITLE: Synthesis of the Poly-4-amino-1,2,4-triazoles (Sintez poli-4-amino-1,2,4-triazolov)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 5, pp 925-926 (USSR)

ABSTRACT: In this paper the reaction of hydrazine with a number of dicarboxylic acids and their derivatives at a molar ratio of 2:1 was investigated with eucosane dicarboxylic acid, sebacic-, azelaic-, adipic-, glutaric-, succinic-, and thiodivalerianic acid. The substances obtained were investigated as to their thermomechanical and mechanical properties (Figs 1,2). A surplus of 90 mol % hydrazine was found to be the optimum quantity for the purpose of obtaining pure products with respect to the quantity of hydrazine necessary for the formation of the dihydrazide of the individual acids. The structure of the polytriazoles obtained on the basis of the investigations carried out is assumed to be the following:

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Synthesis of the Poly-4-amino-1,2,4-triazoles

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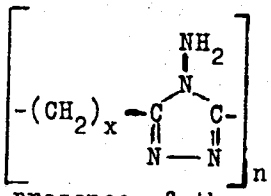

where x = 2,3,4,7,8,20.

The presence of the amino group was proved. Besides, the hydrochloric- and sulfuric acid salts of polyoctamethylene-aminotriazole were produced and by acetylation with acetic anhydride from the polyaminotriazole of the sebacine-hydrazide also N-acetyl-aminotriazole. All products obtained are very stable, and they are not destroyed by boiling in hydrochloric acid and lye. As a film polyoctamethylene-triazole has a great tearing strength $\sim$ 850 kg/cm^2 (Fig 2). There are 2 figures.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental-organic Compounds of the Academy of Sciences, USSR)

SUBMITTED: September 9, 1958

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5(3) SOV/62-59-5-28/40

AUTHORS: Korshak, V. V., Chelnokova, G. N., Shkolina, M. A.

TITLE: On the Problem of the Formation Mechanism of Polyaminotriazoles (K voprosu o mekhanizme obrazovaniya poliaminotriazolov)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye khimicheskikh nauk, 1959, Nr 5, pp 929-931 (USSR)

ABSTRACT: In a previous paper by the same authors (Ref 1) the polycondensation of various dicarboxylic acids with hydrazine was investigated; it was found that in the polycondensation of sebacic acid with hydrazine the nitrogen content of the dihydrazide obtained was somewhat lower than the theoretically calculated content. Agreement with theoretical calculation was obtained only by using a certain surplus of hydrazine. Reference is made to V. W. Fischer (Ref 2), who found it necessary to use the excess hydrazine in order to prevent the possible formation of polyhydrazides and polyoxadiazoles which is possible in this reaction. In connection herewith the polycondensation of hydrazine in the following dicarboxylic acids: sebacic acid, phthalic, isophthalic, and terephthalic acid was investigated in this paper. The characteristics of the salts

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obtained are given in a table. On the one hand, the polycondensation with equimolar ratios hydrazine : dicarboxylic acid, where polyhydrazide was obtained, was investigated, and on the other, the molar ratio 2 (and more) : 1 resulted in polyaminotriazole by the application of pressure. The reaction scheme is assumed to be the following: First, the dihydrazide is formed immediately from the salt of the dicarboxylic acid and hydrazine. The dihydrazine can then be converted under pressure nearly quantitatively into an aminotriazole compound with separation of water. For the conversion of polyhydrazide into the aminotriazole ring an additional surplus of hydrazine is finally necessary. This surplus has a maximum. If the maximum is exceeded, this causes impurities due to polyhydrazide and its hydrolysis-products. Poly-4-amino-1,2,4-triazole is represented. There are 1 table and 2 references, 1 of which is Soviet.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental-organic Compounds of the Academy of Sciences, USSR)

SUBMITTED: September 18, 1958

5(3)

AUTHORS: Korshak, V. V., Polyakova, A. M., Suchkova, M. D. SOV/62-59-6-26/36

TITLE: Polymerisation of Hexafluoro-1,3-butadiene (Polimerizatsiya geksaftor-1,3-butadiyena)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 6, pp 1111 - 1115 (USSR)

ABSTRACT: By way of introduction a short survey is given of what is already known about $CF_2{=}CF{-}CF{=}CF_2$, and about its capability of forming polymers (Refs 1-8). Since publications scarcely deal with these compounds, they were investigated by the authors, the conditions for their polymerisation and the properties of the polymers obtained were determined. Different initiators were used for polymerisation: $(C_2H_5OCOO)_2$ (A) at 50°, $[(CH_3)_3CO]_2$ (B) at 90-130° and 500-6000 atmospheres and $[(CH_3)_2C(CN)N]_2$ (C) at 6000 atmospheres, triethylaluminum (D) and tributylboron (E). Suspension polymerisation was investigated in the presence of potassium persulphate (F). The three latter methods (D,E,F) failed. Tables

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1-5 give the investigation results obtained by using the different initiators. The initiator A proved to be most effective (yield 90% at 1.6 wt% A, pressure 6000 atmospheres, temperature 50°). A yield of only 33% was obtained with the initiator B, and if no initiator was used at all, after long heating and a pressure of 6000 atmospheres only a yield of 18%. In some figures the influence of pressure (Fig 1) and temperature (Fig 2) upon the polymerisation rate, and the influence of the initiator (Fig 3), the pressure (Fig 4), and the temperature (Fig 5) upon the thermomechanical properties of the polymers produced is shown. The thermomechanical properties were determined by the apparatus by Tsvetlin (Ref 9). There are 5 figures, 5 tables, and 9 references, 1 of which is Soviet.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental Organic Compounds of the Academy of Sciences, USSR)

SUBMITTED: September 3, 1957

5(3)

AUTHORS: Korshak, V. V., Polyakova, A. M., Mironov, V. F., SOV/62-59-6-27/36
Petrov, A. D., Tambovtseva, V. S.

TITLE: On the Polymerization Mechanism of the Alkenylhydride Silanes
(O mekhanizme polimerizatsii alkenilgidridsilanov)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 6, pp 1116 - 1125 (USSR)

ABSTRACT: The polymerization capability of monoalkenylhydride silane with the general formula $R-\overset{H}{\underset{R_1}{Si}}-R$ was investigated. In this formula

$R = CH_3$, C_2H_5, Cl, OC_2H_5; $R_1 = CH_2-CH=CH_2$, $OCH_2-CH=CH_2$ and $CH_2-\overset{CH_3}{C}=CH_2$.

The peroxide of the tertiary buthyl, and platinum on coal served as polymerizers. Like in the case of other investigations (Refs 2,3), polymers of the general formula $(CH_3)_3Si(CH_2)_nSi(CH_3)_3$ with n=1,2,3 (I) n=1 (II) n=2 (III) n=3 were found. The structure of the polymers obtained was determined by means of the infrared spectrum.

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The spectra were compared with the spectrum of the polymer produced from $(CH_3)_2H.SiCH_2-CH=CH_2$ by heating with platinum on coal (IV). L. A. Leytes and V. N. Smorchkov plotted and interpreted the spectra. The investigations of the infrared spectra showed that the allyldialkyl (aryl) silanes polymerize in a different way under formation of differently structured polymers in dependence on the polymerizer. In the presence of the buthyl peroxide and at a pressure of 6000 atmospheres a macro molecule (A) was formed, in which the S-H bond is not split up. This conclusion is made because of the presence of the band (2100 cm^{-1}) characteristic of the S-H group, which is also to be found in the spectrum of the initial monomer and in the spectrum (IV). The other form of polymers (B) is produced in the presence on platinum on coal. They contain the band weakly mentioned either in a weak form or not at all, while the bands in the range of from 1050-1150 cm^{-1} are clearly determined. These polymers exhibit the following structure: $-\left[\begin{matrix}R\\|\\Si\\|\\R\end{matrix}-CH_2-CH_2-CH_2-\begin{matrix}R\\|\\Si\\|\\R\end{matrix}-CH_2-CH_2-CH_2\right]-$. The polymers obtained are differently consistent substances, oily to solid, in dependence on the

character of the radicals on the silicon atom. The data concerning the different polymers are given in table 1. In the experimental part the syntheses of the single polymers from the monomers concerning are described. Table 3 gives the physical constants of the initial monomers and figures 1-16 show the infrared spectra of the different polymers. There are 16 figures, 2 tables, and 5 references, 4 of which are Soviet.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental Organic Compounds of the Academy of Sciences, USSR) and Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute of Organic Chemistry imeni N. D. Zelinskiy of the Academy of Sciences, USSR)

SUBMITTED: September 3, 1957

5(3) SOV/62-59-8-21/42

AUTHORS: Korshak, V. V., Polyakova, A. M., Stoletova, I. M.

TITLE: Investigation of the Effect of Pressure on the Polymerization Capacity of α-Methylstyrenes Substituted in the Nucleus. Communication 1. Polymerization of p-Substituted α-Methylstyrenes Under Pressure

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 8, pp 1471-1476 (USSR)

ABSTRACT: In order to investigate the above mentioned p-substituted styrenes the following monomers were synthesized according to methods already mentioned in literature: p,α-dimethylstyrene, p-chloro-α-methylstyrene, p-bromo-α-methylstyrene. They cannot polymerize according to the radical mechanism but form copolymers (Refs 3, 4). The polymerization was carried out at a pressure of 6000 atm and 120° in 5 hours. The results are given in tables 1-4 and figures 1-9. From these results it follows that the p,α-methylstyrene which usually does not polymerize according to the radical mechanism is able to polymerize under extremely high pressures. When different pressures were applied it was found that all monomers investigated polymerize at 6000 atm without initiator and give a good yield. p-Chloro-α-methylstyrene has

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Investigation of the Effect of Pressure on the Polymerization Capacity of α-Methylstyrenes Substituted in the Nucleus, Communication 1. Polymerization of p-Substituted α-Methylstyrenes Under Pressure

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the highest polymerization rate. At 4500 atm p-bromo-methylstyrene is slowest. It has the greatest spatial hindrance in its molecule compared to the other monomers. In the case of all three monomers the reaction rate increases with an increase of the pressure from 1 - 6000 atm. The molecular weight of the polymers increased as well. Furthermore, the polymers were investigated thermomechanically and it was found that the nature of the substituents in α-methylstyrene influences the thermomechanical properties of the polymer. The syntheses of the monomers are described. There are 1 figure, 1 table, and 14 references, 4 of which are Soviet.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental-organic Compounds, Academy of Sciences, USSR)

SUBMITTED: October 10, 1957

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5(3) SOV/62-59-8-22/42

AUTHORS: Korshak, V. V., Polyakova, A. M., Stoletova, I. M.

TITLE: Investigation of the Effect of Pressure on the Polymerization Capacity of α-Methylstyrenes Substituted in the Nucleus. Communication 2. Ortho-substituted α-Methylstyrenes

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 8, pp 1477-1479 (USSR)

ABSTRACT: The following compounds were investigated with respect to their capacity to polymerize under pressure: o,α-dimethylstyrene, o-chloro-α-methylstyrene, and 2,5-dichloro-α-methylstyrene. The second compound polymerizes neither according to the radical nor ion mechanism, nor can it be copolymerized. As in the case of p-substituted styrenes (Ref 1), the investigations were carried out at a pressure of 6000 atm and temperatures between 120 and 180°. The results showed that the said compounds could not polymerize according to the radical mechanism, while copolymerizates with styrene and p-chlorostyrene were obtained.

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Investigation of the Effect of Pressure on the Polymerization Capacity of α-Methylstyrenes Substituted in the Nucleus. Communication 2. Ortho-substituted α-Methylstyrenes

SOV/62-59-8-22/42

The results are given in a table. The reason for the resistance to polymerization is considered to be the screening effect of the α-methyl group and the blocking effect of the o-substituent. The synthesis of the monomers is described in the experimental part. There are 1 figure, 1 table, and 5 references, 2 of which are Soviet.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Elemental-organic Compounds, Academy of Sciences, USSR)

SUBMITTED: October 10, 1957

Card 2/2

KORSHAK, V.V.

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SOV/62-59-12-41/43

AUTHORS: Polyakova, A. M., Suchkova, M. D., Vdovin, V. M., Mironov, V. F., Korshak, V. V., Petrov, A. D.

TITLE: Concerning the Interaction of Acetylene With Siloxanes and Silanes. Brief Communications

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 12, pp 2257-2259 (USSR)

ABSTRACT: Purified acetylene in reaction with disiloxanes $HR_2SiOSiR_2H$ (where R = CH_3 and C_2H_5) under atmospheric pressure, in presence of chloroplatinic acid in isopropanol or platinum on carbon, gave polymers in the form of thick oils. IR spectra and other analytical data indicate that the macromolecules of these polymers consist of units:

$$-\left[-\underset{R}{\overset{R}{Si}}-O-\underset{R}{\overset{R}{Si}}-CH_2-CH_2-\right]_n-,$$

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where n = 2 to 14. Physical and chemical constants of polymers obtained in 30.0 to 87.4% yield from tetramethyl-, dimethyldiethyl-, and tetraethyldisiloxanes are tabulated. In similar reactions, purified acetylene with methylphenylchlorosilane $(CH_3)C_6H_5SiClH$ under atmospheric pressure, in the presence of chloroplatinic acid in isopropanol, gave 1,2-bis-(phenylmethylchlorosilyl)ethane $Cl(CH_3)(C_6H_5)SiCH_2CH_2Si(C_6H_5)(CH_3)Cl$ in 88% yield. Reaction of acetylene with methyldichlorosilane CH_3SiCl_2H gave similarly 1,2-bis-(methyldichlorosilyl)ethane $Cl_2(CH_3)SiCH_2CH_2Si(CH_3)Cl_2$ in 9% yield; the balance consisted in the unreacted starting silane. Acetylene must be completely free of any impurities which could poison the catalyst. IR spectra were taken by N. A. Chumayevskiy. There is 1 table; and 7 references, 2 U.S., 1 Japanese, 4 Soviet. The U.S. references are: J. W. Curry, J. Amer.

Card 2/3

Chem. Soc., 78, 1636 (1956); J. L. Speier, D. B. Hook, U.S. Pat. 2823218, 11-02-58.

ASSOCIATION: Institute of Elemento-Organic Compounds, Academy of Sciences, USSR, and N. D. Zelinskiy Institute of Organic Chemistry, Academy of Sciences, USSR (Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR i Institut organicheskoy khimii imeni N. D. Zelinskogo Akademii nauk SSSR)

SUBMITTED: May 25, 1959

Card 3/3

KORSHAK, V.V.; CHELNOKOVA, G.N.; GRIBKOVA, P.N.

Heterochair polyamides. Part 11: Synthesis and study of polyamides containing sulfide and sulfonic sulfur in their chains. Vysokom.soed. 1 no.2:208-214 F '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides) (Polymers)

FRUNZE, T.M.; KORSHAK, V.V.; v vypolnenii eksperimental'noy raboty prinimali uchastiye; KRASNYANSKAYA, E.A.; MAKARKIN, V.A.; ZHIROVA, L.V.

Heterochain polyamides. Part 12: Isomorphism of polymers in the polyamide group. Vysokom.soed. 1 no.2:287-292 F '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides) (Polymers)

FRUNZE, T.M.; KORSHAK, V.V.; v provedenii eksperimental'noy raboty prinimala uchastiye Zhirova, L.V.

Heterochain polyamides. Part 13: Mixed polyamides containing sulphur atoms in the main chain. Vysokom.soed. 1 no.2:293-300 F '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides)

FRUNZE, T.M.; KORSHAK, V.V.; MAKARKIN, V.A.

Heterochain polyamides. Part 14: Amorphous structures in polyamides. Vysokom. soed. 1 no.3:342-348 Mr '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides) (Polymers)

FRUNZE, T.M.; KORSHAK, V.V.; PETROVA, V.P.

Heterochain polyamides. Part 15: Polyamides of hydroaromatic acids. Vysokom. soed. 1 no.3:349-356 Mr '59.
(MIRA 12:10)

1.Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides) (Hydroaromatic compounds)

VINOGRADOVA, S.V.; KORSHAK, V.V.; KOLESHIKOV, G.S.; ZHURAVOV, B.A.

Heterochain polyesters. Part 17: Polyesters of phosphorylated dicarboxylic acids. Vysokom. soed. 1 no.3:357-361 Mr '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Esters)

FRUNZE, T.M.; KORSHAK, V.V.; KRASNYANSKAYA, E.A.

Heterochain polyamides. Part 17: Polyamides made from p-xylenediamine. Vysokom.soed. 1 no.4:495-499 Ap '59. (MIRA 12:9)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides) (Phenylenediamine)

FRUNZE, T.M.; KORSHAK, V.V.; ANDRIYEV, D.N.; KUKHARSKAYA, E.V.

Heterochain polyamides. Part 16: Polyamides containing siloxane groups in the main chain. Vysokom.soed. 1 no.4:489-494 Ap '59. (MIRA 12:9)

1. Institut elementoorganicheskikh soyedineniy An SSSR, i Institut khimii silikatov AN SSSR.
(Amides)

FRUNZE, T.M.; KORSHAK, V.V.; MAKARKIN, V.A.

Heterochain polyamides. Part 18: Obtaining mixed polyamides by melting homogeneous polyamides. Vysokom.soed. 1 no.4:500-505 Ap '59. (MIRA 12:9)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides)

FRUNZE, T.M.; KORSHAK, V.V.; ROMANOVA, Z.V.

Heterochain polyamides. Part 19: Polyamides obtained from cis- and trans-isomers of 1,3-diaminocyclohexane and aliphatic dicarboxylic acids. Vysokom.soed. 1 no.4:518-525 Ap '59.
(MIRA 12:9)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides) (Cyclohexanediamine) (Acids)

SLONIMSKIY, G.L.; FRUNZE, T.M.; KORSHAK, V.V.; ROGOVINA, L.Z.

Effect of the composition of mixed polyamides on their phase state. Vysokom.soed. 1 no.4:526-529 Ap '59. (MIRA 12:9)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides) (Phase rule and equillibrium)

SLONIMSKIY, G.L.; FRUNZE, T.M.; KORSHAK, V.V.; ROMANOVA, Z.V.; ROGOVINA, L.Z.

Thermomechanical study of polyamides made from cis- and trans-isomers of diaminocyclohexane and aliphatic dicarboxylic acids. Vysokom.soed. 1 no.4:530-533 Ap '59. (MIRA 12:9)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides) (Cyclohexanediamine) (Acids)

VINOGRADOVA, S.V.; KORSHAK, V.V.

Heterochain polyesters. Part 18: Polyesters of o-xylyleneglycol. Vysokom.soed. 1 no.5:649-655 My '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Xylenediol)

VINOGRADOVA, S.V.; KORSHAK, V.V.; v eksperimental'noy rabote prinimali uchastiye laboranty: ARTEMOVA, V.S., MOROZOVA, D.T.

Heterochain polyesters. Part 19: Polyesters of quinite. Vysokom. soed. 1 no.5:656-661 My '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Cyclohexanediol)

FRUNZE, T.M.; KORSHAK, [redacted] KURASHEV, V.V.

Phosphorous organic polymers. Part 6: Polyamides of some phosphorus-containing dicarboxylic acids. Vysokom.soed. 1 no.5:670-676 My '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides) (Acids, Organic)

FRUNZE, T.M.; KORSHAK, V.V.; KOZLOV, L.V.; KURASHEV, V.V.

Phosphorous organic polymers. Part 7: Mixed phosphorus-containing polyamides. Vysokom.soed. 1 no.5:677-681 My '59.
(MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides)

KORSHAK, V.V.; ROGOZHIN, S.V.; VOLKOV, V.I.

Heterochain polyamides. Part 20: Preparation of polyamides by reaction between carbon suboxide and diamines. Vysokom. soed. 1 no.6:799-803 Je '59. (MIRA 12:10)

1.Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides) (Carbon oxide) (Amines)

KORSHAK, V.V.; ROGOZHIN, S.V.; VOLKOV, V.I.

Heterochain polyesters. Part 20: Reaction of carbon suboxide with glycols and biphenols. Vysokom. soed. 1 no.6:804-808 Je '59. (MIRA 12:10)

1.Institut elementoorganicheskikh soyedineniy AN SSSR.
(Carbon oxide) (Glycol) (Phenol)

FRUNZE, T.M.; KORSHAK, V.V.

Heterochain polyamides. Part 21: Structural dependence of the melting temperature in homologous series of heterochain polymers. Vysokom. soed. 1 no.6:809-818 Je '59. (MIRA 12:10)

1.Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides) (Polymers)

KORSHAK, V.V.; GRIBOVA, I.A.; ANDREYEVA, M.A..

Organophosphorus polymers. Part 8: Polyesters of phosphonic acids and of some aromatic dioxycompounds. Vysokom. soed. 1 no.6:825-828 Je '59. (MIRA 12:10)

1.Institut elementoorganicheskikh soyedineniy AN SSSR.
(Polymers) (Phosphorus organic compounds)

KORSHAK, V.V.; VINOGRADOVA, S.V.

Heterochain polyesters. Part 21: Mixed polyesters made from diatomic phenols. Vysokom. soed. 1 no.6:834-837 Je '59. (MIRA 12:10)

1.Institut elementoorganicheskikh soyedineniy AN SSSR.
(Systems (Chemistry)) (Phenols)

VINOGRADOVA, S.V.; KORSHAK, V.V.

Heterochain polyesters. Part 22: Mixed polyesters of diatomic phenols. Vysokom. soed. 1 no.6:838-841 Je '59. (MIRA 12:10)

1.Institut elementoorganicheskikh soyedineniy AN SSSR.
(Systems (Chemistry)) (Phenols)

SLONIMSKIY, G.L.; KORSHAK, V.V.; GOLUBEV, V.V.; VELIKOVSKAYA, N.A.

Properties of mixed glycol polyesters of terephthalic and sebacic acids as a function of the acid ratio. Vysokom. soed. 1 no.6:925-929 Je '59. (MIRA 12:10)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Terephthalic acid) (Sebacic acid)

KORSHAK, V.V.; SOSIN, S.L.; CHISTYAKOVA, M.V.

Obtaining macromolecular compounds by the reaction of polyrecombination. Vysokom.soed. 1 no.7:937-945 Jl '59. (MIRA 12:11)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Macromolecular compounds) (Polymerization)

KORSHAK, V.V.; MOZGOVA, K.K.; LAVRISHCHEV, V.P.

Effect of low molecular compounds on the photochemical decomposition of the polyamide anide G-669. Vysokom.soed. 1 no.7:990-997 Jl '59. (MIRA 12:11)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides)

KORSHAK, V.V.; POLYAKOVA, A.M.; TAMBOVTSEVA, Ye.S.

Synthesis and polymerization of p-triethylplumbyl-α-methylstyrene. (MIRA 12:11)
Vysokom.soed. 1 no.7:1021-1023 Jl '59.

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Styrene)

KORSHAK, V.V.; MOZGOVA, K.K.; LAVRISHCHEV, V.P.

Effect of low molecular weight organic compounds on the process of photochemical destruction of -polycaproamide. Vysokom.soed. 1 no.8:1159-1163 Ag '59. (MIRA 13:2)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Hexanamide) (Photochemistry)

KORSHAK, V.V.; MOZGOVA, K.K.; LAVRISHCHEV, V.P.

Effect of low molecular weight compounds on the photochemical destruction of the polyamide anide G-669. Vysokom. soed. 1 no.8:1164-1169 Ag '59. (MIRA 13:2)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Amides) (Photochemistry)

KORSHAK, V.V.; MOZGOVA, K.K.; SHKOLINA, M.A.

Preparation of graft copolymers. Part 3: Grafting of vinyl monomers on polyamides. Vysokom. soed. 1 no.9:1364-1368 S '59. (MIRA 13:3)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Polymers) (Amides)

VINOGRADOVA, S.V.; KORSHAK, V.V.

Heterochain polyesters. Part 23: Effect of the structure of the polyester unit on the fusion temperature of the polyester. Vysokom.soed. 1 no.10:1473-1481 O '59. (MIRA 13:3)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Esters)

KORSHAK, V.V.; MOZGOVA, K.K.; SHKOLINA, M.A.

Preparation of graft polymers. Part 4: Grafting of styrene on polyamides. Vysokom.soed. 1 no.11:1573-1579 N '59. (MIRA 13:5)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Polymers) (Styrene) (Amides)

KORSHAK, V.V.; ZAMYATINA, V.A.; BEKASOVA, N.I.

Heterochain polyesters. Part 25: Polycondensation in a thin layer. Vysokom.soed. 1 no.11:1586-1592 N '59. (MIRA 13:5)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Condensation products (Chemistry))

KORSHAK, V.V.; MOZGOVA, K.K.; SHKOLINA, M.A.

Preparation of graft copolymers. Part 5: Grafts by vinyl monomers on polyethylene terephthalate. Vysokom.soed. 1 no.11:1604-1609 N '59. (MIRA 13:5)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Terephthalic acid) (Vinyl compounds)

KORSHAK, V.V.; KRONGAUZ, Ye.S.; SLADKOV, A.M.; SHEINA, V.Ye.; LUNEVA, L.K.

Coordination chain polymers. Part 1: Preparation of polymers of bis-(β-diketones) and metals. Vysokom.soed. 1 no.12: 1764-1771 D '59. (MIRA 13:5)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Ketones) (Organometallic compounds) (Polymers)

KORSHAK, V.V.; CHELNOKOVA, G.N.; SHKOLINA, M.A.

Mixed poly-4-amino-1,2,4-triazoles. Vysokom.soed. 1 no.12: 1772-1777 D '59. (MIRA 13:5)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Triazole)

FRUNZE, T.M.; KORSHAK, V.V.; KURASHEV, V.V.; ALIYEVSKIY, P.A.

Heterochain polyamides. Part 22: Effect of certain factors on the process of formation of the polyamide in a two-phase system. Vysokom.soed. 1 no.12:1795-1800 D '59. (MIRA 13:5)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Polyamides)

KORSHAK, V.V.; ZAMYATINA, V.A.; YUKEL'SON, I.I.; BEKASOVA, N.I.

Polycondensation in a thin layer. Khim.nauka i prom. 4 no.4: 546-547 '59. (MIRA 13:8)

1. Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR.
(Condensation products (Chemistry))

SOV/74-28-7-1/5

5(2)

AUTHORS: Korshak, V. V., Mozgova, K. K.

TITLE: Inorganic High-molecular Compounds (Neorganicheskiye vysokomolekulyarnyye soyedineniya)

PERIODICAL: Uspekhi khimii, 1959, Vol 28, Nr 7, pp 783 - 825 (USSR)

ABSTRACT: In order to show the present-day stage and the development trends in the field of inorganic polymers the authors have generalized in the present paper the material assembled so far. As it is impossible to treat all details concerning these compounds the authors refer to the special monographies dealing with this subject (Refs 2-8). The same applies to the article on experimental methods in the field of polymeric chemistry (Refs 9-14). The first to attempt a classification of inorganic polymers was Meyer (Ref 14). Since, however, the number of compounds belonging to this group is considerable, a classification which is based on the structure of macromolecules only, and not on their chemical composition, is insufficient. For this reason the authors use the classification proposed by one of them (Refs 15-17). On the basis of this classification all high-molecular compounds are divided, according to their composition, into two main groups. The first group comprises having homogeneous chains, the second compounds having heterogeneous chains. The problem of classi-

fication is also dealt with in references 18, 19, etc. Further-
more, high-molecular compounds have to be classified in two
groups, according to their structure: 1) compounds with one state
of aggregation only; 2) compounds having two states of aggrega-
tion. The organic high polymers mainly comprise polymers with
homogeneous (carbon) chains, the inorganic high polymers, however,
mostly have heterogeneous chains. The capacity of forming polymers
is unquestionably dependent upon the position of the respective
elements in Mendeleyev's periodic system (Fig 1). The systematic
distribution of the elements is shown even more clearly by the
periodic system interpreted by Bohr (Fig 2). It is seen that ele-
ments forming polymers occupy an intermediate position between
metals and elements which do not form polymers. Table 1 contains
data on the strength of the bonds of various elements. In a study
of polymers with homogeneous chains it was found that there are
relatively few elements which are able to form such polymers.
In the case of polymers with heterogeneous chains their number
increases considerably. Among the polymers with heterogeneous
chains there is a special group of complex compounds, which have
been thoroughly discussed in Grinberg's monography (Ref 23).

The polymers with homogeneous chains are explained in the order in which the elements by which they are formed appear in the periodic system. Table 3 lists the most important properties of these polymers. Furthermore, various polymers of this group are described (Refs 24-97). The number of inorganic compounds of high molecular weight belonging to the group of polymers with heterogeneous chains is extremely large. These compounds are usually formed by the inclusion of atoms of another element between atoms of the respective element. The most frequent compounds of this type are oxygen compounds - polymeric oxides, nitrogen compounds - polymeric nitrides, carbon compounds - polymeric carbides, and boron compounds - polymeric borides. The group of complex compounds has not yet been subjected to a thorough investigation, but there is no doubt that polymeric compounds with coordinate bonds will form an important part of the chemistry of polymers. Furthermore, polymeric compounds are shown in the order in which the elements by which they are formed appear in the Mendeleyev system: Group I (Refs 98-100), Group II (Refs 101-110), Group III (Refs 111-181), Group IV (Refs 182-356), Group V (Refs 357-399), Group VI (Refs 400-424), Group VII (Refs 425 - 427), Group VIII (Refs 428-434).

The present paper intended to show the influence of the nature of individual elements on their capacity to form polymers and the effects of this capacity on the properties of the polymers. At the same time the peculiarities of inorganic high-molecular compounds due to which these differ from organic compounds were shown. The difference is explained by the fact that in the case of organic polymers there are more linear carbon chain structures, while in the case of inorganic compounds steric structures with heterogeneous chains prevail. There are 17 figures, 4 tables, and 434 references, 100 of which are Soviet.

ASSOCIATION: In-t elementoorganicheskikh soyedineniy AN SSSR Moskva (Institute of Elemental-organic Compounds, Academy of Sciences, USSR, Moscow)

5(4) SOV/20-126-1-33/62

AUTHORS: Tsetlin, B. L., Sergeyev, V. A., Rafikov, S. R., Korshak, V. V., Corresponding Member AS USSR, Glazunova, P. Ya., Bubis, L. D.

TITLE: The After-effect in the Irradiation of Methylmethacrylate in the Presence of Oxygen (Effekt posledeystviya pri obluchenii metilmetakrilata v prisutstvii kisloroda)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 1, pp 123-125 (USSR)

ABSTRACT: It is a known fact that oxygen inhibits the radical polymerization of many vinyl monomers. This is the case also with radiation polymerization (Ref 1). However, the irradiated monomer is able to polymerize later, as soon as the supply of oxygen is interrupted (Ref 2). This manner of utilizing ionization energy is of practical interest. The authors investigated the basic rules of this process. The monomer was irradiated with fast electrons (900 kev) in an accelerator of the second Institute mentioned under Association. Figure 1 shows the kinetic polymerization curve in dependence on the radiation dose R. The initial velocity V_o of polymerization is, as figure 2 shows, proportional to $R^{1/2}$.

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The After-effect in the Irradiation of Methylmethacrylate in the Presence of Oxygen SOV/20-126-1-33/62

Figure 3 shows the influence exercised by temperature upon V_o. Polymerization was introduced by evacuation. The activation energy was calculated as amounting to 11.2 kcal/mol. It is thus considerably lower than the activation energy in the polymerization of methyl methacrylate with benzoyl peroxide, which amounts to 19.7 kcal/mol. The high activity of the peroxide groups formed by irradiation facilitates polymerization at low temperatures. Figure 4 shows the development of polymerization by irradiation, and, as a comparison, the effect of 0.01 % benzoyl peroxide. Apart from the low reaction temperature, irradiation offers the further advantage that, after irradiation, polymerization may be begun at any desired point of time. There are 4 figures and 9 references, 5 of which are Soviet.

Inst Elementi-Organic Cmpds. AS USSR
Inst Phys Chem, AS USSR

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SOV/20-126-4-28/62

5(3)
AUTHORS: Korshak, V. V., Corresponding Member AS USSR; Polyakova, A.M.; Sakharova, A. A.; Petrov, A. D., Corresponding Member AS USSR; Chernyshev, Ye. A.

TITLE: Polymerization of Vinylaromatic Organosilicon Compounds (Polimerizatsiya vinilaromaticheskikh kremniyorganicheskikh soyedineniy). The Derivatives of α-Methylstyrene (Proizvodnyye α-metilstirola)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 4, pp 791-793 (USSR)

ABSTRACT: The authors already examined the polymerizability of the compounds mentioned in the title, containing silicium combined to the carbon of the benzene ring. In doing so, they produced glass like polymers and defined their properties. The compounds mentioned in the title are described in the present article in this regard, but they contain silicium which is combined with the benzene ring through methyl groups.

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SOV/2o-126-4-28/62

Polymerization of Vinylaromatic Organosilicon Compounds. The Derivatives of α-Methylstyrene

There are 2 figures, 1 table, and 2 Soviet references.

ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute for Elemental Organic Compounds of the Academy of Sciences, USSR). Institut organicheskoy khimii im. N. D. Zelinskogo Akademii nauk SSSR (Institute for Organic Chemistry imeni N. D. Zelinskiy of the Academy of Sciences, USSR)

SUBMITTED: April 5, 1959

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